

10 meter Sub-Orbital Large Balloon Reflector (LBR)

Completed Technology Project (2014 - 2015)

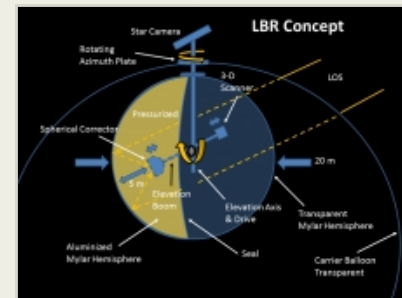


Project Introduction

This is the lead NIAC Phase II proposal for "10 meter Sub-Orbital Large Balloon Reflector (LBR)" with Christopher K. Walker as PI. We propose to develop and demonstrate the technology required to realize a suborbital, 10 meter class telescope suitable for operation from radio to THz frequencies. The telescope consists of an inflatable, half-aluminized spherical reflector deployed within a much larger carrier stratospheric balloon. Besides serving as a launch vehicle, the carrier balloon provides a stable mount for the enclosed telescope. Looking up, the LBR will serve as a telescope. Looking down, the LBR can be used for remote sensing or telecommunication activities. By combining successful suborbital balloon and ground-based telescope technologies, the dream of a 10 meter class telescope free of ~99% of the Earth's atmospheric absorption in the far-infrared can be realized. The same telescope can also be used to perform sensitive, high spectral and spatial resolution limb sounding studies of the Earth's atmosphere in greenhouse gases and serve as a high flying hub for any number of telecommunications and surveillance activities. LBR is a multi-institution effort between the University of Arizona (the PI institution), SWRI, JPL, and APL. LBR was selected in 2013 by the NASA Innovative Advanced Concepts (NIAC) program to proceed into Step B of the NIAC Phase I program. This makes LBR eligible to propose for a 2014 Phase II award. The goal of our NIAC Phase II effort is to bring LBR concepts to a Technology Readiness Level of at least 2 in maturity, by addressing key unknowns, assumptions, risks, and paths forward remaining after the completion of our Phase I study.

Anticipated Benefits

By combining successful suborbital balloon and ground-based telescope technologies, the dream of a 10 meter class telescope free of ~99% of the Earth's atmospheric absorption in the far-infrared can be realized. The same telescope can also be used to perform sensitive, high spectral and spatial resolution limb sounding studies of the Earth's atmosphere in greenhouse gases and serve as a high flying hub for any number of telecommunications and surveillance activities.



Project Image 10 meter Sub-Orbital Large Balloon Reflector (LBR)

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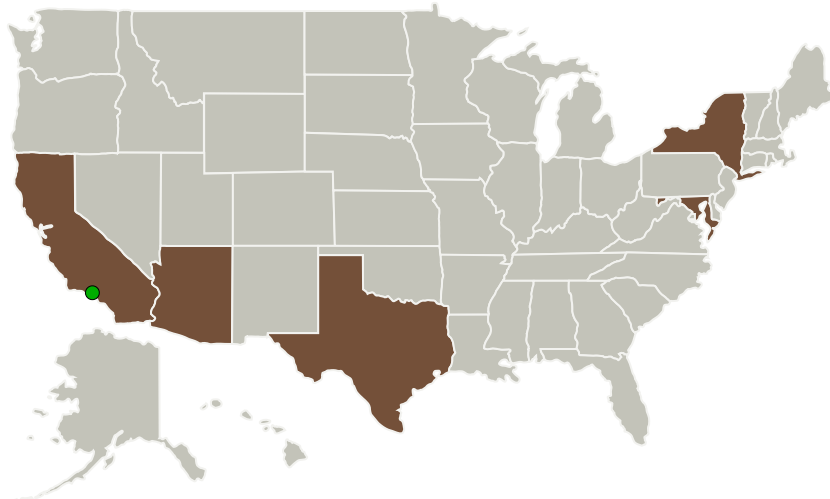
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Primary U.S. Work Locations and Key Partners



Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

University of Arizona

Responsible Program:

NASA Innovative Advanced Concepts

Project Management

Program Director:

Jason E Derleth

Program Manager:

Eric A Eberly

Principal Investigator:

Christopher M Walker

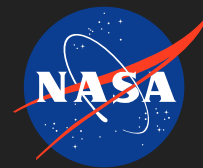
Co-Investigators:

Paul F Goldsmith
Craig A Kulesa
German Cortes-medellin
Ira L Smith
Pietro Bernasconi

Organizations Performing Work	Role	Type	Location
University of Arizona	Lead Organization	Academia	Tucson, Arizona
Cornell University	Supporting Organization	Academia	Ithaca, New York
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California
Johns Hopkins University Applied Physics Laboratory(JHU/APL)	Supporting Organization	R&D Center	Laurel, Maryland
Southwest Research Institute - San Antonio(SWRI)	Supporting Organization	Academia	San Antonio, Texas

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Primary U.S. Work Locations

Arizona	California
Maryland	New York
Texas	

Images

**13744-1390338421600.jpg**

Project Image 10 meter Sub-Orbital Large Balloon Reflector (LBR)
 (<https://techport.nasa.gov/image/102131>)

Links

Ballooning Expectations: New Approach for Astronomy
 (<https://www.nasa.gov/feature/ballooning-expectations-new-approach-for-astronomy>)

Disruptive space telescope concepts, designs, and developments: OASIS and Nautilus
 (https://www.epj-conferences.org/articles/epjconf/pdf/2020/14/epjconf_eosam2020_06001.pdf)

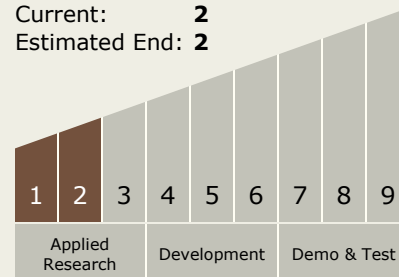
Orbiting Astronomical Satellite for Investigating Stellar Systems (OASIS)
 (<https://assets.pubpub.org/m6uk0xql/11598545081550.pdf>)

Project Website:

<https://www.nasa.gov/directorates/spacetech/home/index.html>

Technology Maturity (TRL)

Start: **1**
 Current: **2**
 Estimated End: **2**



Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
 - TX13.2 Test and Qualification
 - TX13.2.1 Mechanical/Structural Integrity Testing

Target Destination

Earth